Amendments to the Claims:

This listing of claims will replace all prior versions, and listing, of claims in the application:

Listing of Claims:

Claim 1(Original): A method for the transfer of a nucleic acid composition to cells, comprising the step of introducing a multifunctional molecular complex into cells,

wherein said multifunctional molecular complex comprises:

A) a nucleic acid composition; and

B) a transfer moiety comprising

(i) one or more cationic polyamine components, wherein each cationic polyamine is non-covalently bound to said nucleic acid composition and comprises from three to twelve nitrogen atoms; and

(ii) one or more endosome membrane disruption promoting components attached to at least one nitrogen atom of at least one of said polyamine components through an alkyl, carboxamide, carbamate, thiocarbamate, or carbamoyl bridging group, said one or more endosome membrane disruption promoting components independently selected from (a) at least one lipophilic long chain alkyl group or (b) a fusogenic peptide, cholic acid or cholesteryl group or a derivative thereof;

wherein said multifunctional molecular complex transfers said nucleic acid composition to said cells.

Claim 2(Original): A method according to Claim 1 wherein said nucleic acid composition is a nucleic acid molecule that comprises a nucleotide sequence that encodes a peptide or protein, or serves as a template for a nucleic acid molecule.

Claim 3(Currently Amended): A method according to Claim 2 wherein the peptide, protein or nucleic acid molecule is ~~a product of industrial, commercial or scientific value,~~ selected from the group consisting of ~~therapeutic agents;~~ vaccines; foodstuffs and nutritional supplements; compounds of agricultural significance; herbicides and plant growth regulants; insecticides; miticides; rodenticides; and fungicides; compounds useful in animal health; parasiticides; nematocides.

Claim 4(Original): A method according to Claim 1 wherein the target cells are cultures of host cells comprising microorganism cells of bacteria, yeast, plant or mammalian cells; said cell cultures being maintained in accordance with fermentation techniques which maximize production of the peptide, protein or functional nucleic acid molecule being produced.

Claim 5(Original): A method according to Claim 1 wherein the nucleic acid composition comprises a nucleotide sequence that encodes a protein and is operably linked to regulatory sequences.

Claim 6(Original): A method according to Claim 1 wherein the nucleic acid composition comprises a nucleotide sequence that encodes a protein which comprises at least one epitope that is identical or substantially similar to an epitope of an antigen against which an immune response is desired, said nucleotide sequence being operably linked to regulatory sequences.

Claim 7(Original): The method according to claim 1, wherein the transfer moiety of said multifunctional molecular complex further comprises at least one receptor specific binding component which is a ligand for a receptor on a target cell.

Claim 8(Original): The method according to claim 1, wherein the cationic polyamine comprises the formula (1):

$$NR(R^3)\text{-}[\text{-}(CR^1R^2)_m\text{-}N(R^3)\text{-}]_n\text{-}(CR^1R^2)_m\text{-}NR(R^3)$$

(1)

wherein:

R, R^1 and R^2 are each independently selected from the group consisting of hydrogen and $C_{1\text{-}6}$ alkyl;

m in each occurrence is independently selected from the integers 2 through 5 inclusive;

n is selected from the integers 1 through 10 inclusive; and

R^3 is independently selected from the group consisting of hydrogen; $C_{1\text{-}6}$ alkyl, an endosome membrane disruption promoting component, and a receptor specific binding component, or $NR(R^3)$ is guanidino,

wherein said transfer moiety comprises at least one endosome membrane disruption promoting component attached to at least one nitrogen atom of at least one of said cationic polyamine components.

Claim 9(Original): The method according to claim 1, wherein the nucleic acid composition is a plasmid.

Claims 10-16. Currently Cancelled.

Claim 17(Original): The method according to claim 7, wherein the receptor specific binding component is attached through a bridging group to either (i) to a further nitrogen atom of at least one of said cationic polyamine components to which said one or more endosome membrane disruption promoting components is attached, or (ii) to a nitrogen atom of at least one further polyamine component which does not have attached thereto any endosome membrane disruption promoting component.

Claim 18(Original): The method according to claim 17, wherein the bridging group through which the receptor specific binding component is attached is selected from the group consisting of an alkyl, carboxamide, carbamate, thiocarbamate, and carbamoyl bridging group.

Claim 19(Original): The method according to claim 8, wherein said one or more endosome membrane disruption promoting components are independently selected from the group consisting of:

(a) $-B-(CR^1R^2)_j-C(R)_3$, where R is independently selected from the group consisting of hydrogen, C_{1-6} alkyl, or $C(R)_3$ is C_6H_5 aromatic or absent; R^1 and R^2 are each independently selected from the group consisting of hydrogen and C_{1-6} alkyl; j is an integer from 0 to 24 inclusive; and B is optionally absent, or is a bridging group of the formula:

(i) $-(CR^1R^2)_k-C(=O)-Z-$;

(ii) $-(CR^1R^2)_k-N(R)-C(=O)-Z-$;

(iii) $-(CR^1R^2)_k-N(R)-\{-C(=O)-CH_2-O-[-(CH_2)_2-O-]_1-(CH_2)_k-N(R)\}_p-C(=O)-Z-$; or

(iv) $-(CR^1R^2)_k-C(=O)-\{-N(R)-[-(CH_2)_2-O-]_1-CH_2-C(=O)\}_p-Z-$; where k is, independently, an integer from 1 to 11 inclusive, 1 is an integer from 0 to 30 inclusive, and p is an integer from 1 to 3 inclusive; R is independently defined as above or is absent, R^1 and R^2 are each independently selected from the group consisting of hydrogen and C_{1-6} alkyl; and Z is O, OH, S, N(R), or is absent;

(b) $-B-(R^4)R$, where R, R^1 and R^2 are each independently defined as above; B cannot be absent and is a bridging group independently selected from groups (i) through (iv) above, and additionally from the group of the formula:

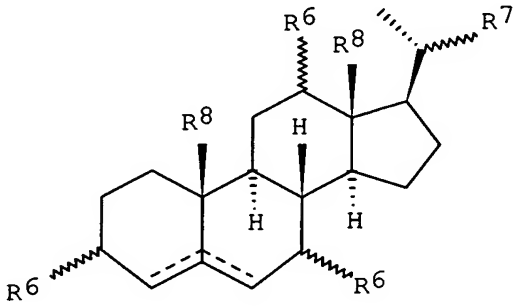
(v) $-(CR^1R^2)_{j=}-X-$, where j= is an integer from 1 to 8 inclusive; R^1 and R^2 are each independently defined as above;

X is O, S, N(R), or absent; and

R^4 is independently selected from the group consisting of:

(i) fusogenic peptides comprising spike glycoproteins of enveloped animal viruses;

(ii) cholic acid derivatives of the formula (2):



(2)

where:

~~wwww~~ represents a bond of unspecified stereochemistry;

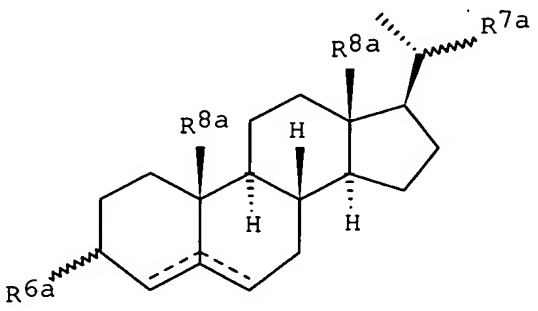
--- represents a single or double bond, forming a saturated or unsaturated portion of the ring system, provided that they cannot both be unsaturated at the same time, whereby the ring system must be either ♠4 or ♠5;

R^6 is -H, -OH, $-CO_2H$, $-C(=O)NH_2$, $-OC(=O)NH_2$, $-NH_2$, or $-O(CH_2CH_2O)_{n=}H$, where n= is an integer from 1 to 6 inclusive;

R^7 is a radical that forms the point of attachment of the cholic acid derivative, comprising $-C_{1-6}$ alkyl- or $-C_{1-6}$ alkylcarbonyl-; and

R^8 is C_{1-6} alkyl; and

(iii) cholesteryl derivatives of the formula (3):



(3)

where:

~~www~~ represents a bond of unspecified stereochemistry;

--- represents a single or double bond, forming a saturated or unsaturated portion of the ring system, provided that they cannot both be unsaturated at the same time, whereby the ring system must be either Δ4 or Δ5;

R^{6a} is a radical that forms the point of attachment of the cholesteryl derivative, comprising -C_{1-6} alkyl-, -OC(=O)-, or -$OCH_2C(=O)$-;

R^{7a} is C_{1-6} alkyl; and

R^{8a} is C_{1-6} alkyl.

Claim 20(Original): The method according to claim 8, wherein R^3 has the formula:

-B-(R^5)-R, where B cannot be absent and is a bridging group independently selected from groups (i) through (v) inclusive; R is independently as defined or absent; and R^5 is a receptor specific binding component independently selected from the group consisting of:

(i) D-biotin;

(ii) β-3'-propionyl galactosyl-β1-4- thioglucoside;

(iii) N^2, N^6-bis(β-3'-propionyl galactosyl-β1-4-thioglucoside)lysine;

(iv) N^2, N^6-bis(β-3'-propionyl galactosyl-β1-4-thioglucoside)lysyl-N^6-(β-3'-propionyl galactosyl-β1-4-thioglucoside)lysine;

(v) 5-methyltetrahydrofolate;

(vi) folic acid;

(vii) folinic acid;

(viii) α-3'-propionyl thiomannoside;

(ix) α-3'-propionyl thiomannoside-6-phosphate; and

(x) an antibody which binds specifically to a cell membrane protein.

Claim 21(Original): The method according to claim 8, wherein the cationic polyamine has the formula: NH_2-$(CH_2)_3$-$N(R^3)$-$(CH_2)_4$-NH_2.

Claim 22(Original): The method according to claim 21 wherein R^3 is an endosome membrane disruption promoting component of the formula -B-$(CR^1R^2)_j$-$C(R)_3$, wherein $C(R)_3$ is C_6H_5 aromatic; R^1 and R^2 are each hydrogen; j is 1; and B is a bridging group of the formula: -$(CR^1R^2)_k$-C(=O)-Z-, wherein k is 5; and Z is O.

Claim 23(Original): The method according to claim 21 wherein R^3 is an endosome membrane disruption promoting component of the formula -B-(R^4)R, wherein B is a bridging group of the formula: -$(CR^1R^2)_k$-C(=O)-Z-; R is absent, R^1 and R^2 are each hydrogen; k is 5, Z is absent; and R^4 is a fusogenic peptide.

Claim 24(Original): The method according to claim 21 wherein R^3 is an endosome membrane disruption promoting component of the formula -B-(R^4)R, wherein B is a bridging group of the formula: -$(CR^1R^2)_{j=}$-X-; R is absent, R^1 and R^2 are each hydrogen; j= is 5, X is N(R); and R^4 is a cholic acid derivative wherein R^6 is OH, R^7 is C_3 alkylcarbonyl and R^8 is C_1 alkyl.

Claim 25(Original): The method according to claim 21 wherein R^3 is an endosome membrane disruption promoting component of the formula -B-(R^5)R, wherein R is absent and B is a bridging group of the formula: -(CR^1R^2)$_k$-N(R)-C(=O)-Z- in which R, R^1 and R^2 are each hydrogen; k is 5, Z is absent; and R^5 is α-3'-propionyl thiomannoside.

Claim 26(Original): The method according to claim 21 wherein R^3 is an endosome membrane disruption promoting component of the formula -B-(CR^1R^2)$_j$-$C(R)_3$, wherein $C(R)_3$ is C_6H_5 aromatic; R^1 and R^2 are each hydrogen; j is 1 and B is a bridging group of the formula: -(CR^1R^2)$_k$-N(R)-C(=O)-Z-; k is 5, N(R) is NH and Z is O.

Claim 27(Original): The method according to claim 8, wherein the cationic polyamine has the formula NH(R^{30})-$(CH_2)_3$-N(R^3)-$(CH_2)_4$-N(R^3)-$(CH_2)_3$-NH(R^{30})
wherein:

R^{30} is hydrogen or NH(R^{30}) is guanidino;

at least one R^3 is an endosome membrane disruption promoting component of the formula -B-(CR^1R^2)$_j$-$C(R)_3$.

Claim 28(Original): The method according to claim 27 wherein:

R^{30} is hydrogen; and

each R^3 is an endosome membrane disruption promoting component of the formula -B-(CR^1R^2)$_j$-$C(R)_3$,

wherein $C(R)_3$ is C_6H_5 aromatic; R^1 and R^2 are each hydrogen; j is 1; and B is a bridging group of the formula: -(CR^1R^2)$_k$-N(R)-C(=O)-Z-;

where k is 5; N(R) is NH; and Z is O.

Claim 29(Original): The method according to claim 27 wherein:

R^{30} is hydrogen; and

each R^3 is an endosome membrane disruption promoting component of the formula -B-$(CR^1R^2)_j$-$C(R)_3$,

wherein B is absent, R, R^1 and R^2 are each hydrogen; and j is 7.

Claim 30(Original): The method according to claim 27 wherein:

$NH(R^{30})$ is guanidino; and

each R^3 is an endosome membrane disruption promoting component of the formula -B-$(CR^1R^2)_j$-$C(R)_3$,

wherein B is absent, R, R^1 and R^2 are each hydrogen; and j is 7.

Claim 31(Original): The method according to claim 27 wherein:

R^{30} is hydrogen;

one R^3 is hydrogen; and

one R^3 is an endosome membrane disruption promoting component of the formula -B-(R^4)-R,

wherein R is absent and B is a bridging group of the formula:

-$(CR^1R^2)_{j=}$-X-, in which R, R^1 and R^2 are each hydrogen; j= is 5; and X is N(R) and

where R^4 is a type (iii) cholesteryl derivative of formula (3):

R^{6a} is O-C(=O)- and a point of attachment of cholesteryl derivative;

R^{7a} is C_5 alkyl; and

R^{8a} is C_1 alkyl.

Claim 32(Original): The method according to claim 27 wherein:

R^{30} is hydrogen;

each R^3 is an endosome membrane disruption promoting component of the formula -B-$(CR^1R^2)_j$-$C(R)_3$,

wherein B is a bridging group of the formula: -$(CR^1R^2)_k$-C(=O)-Z-; R^1 and R^2 are each hydrogen; j is 0, k is 11; Z is N(R) where R is C_1 alkyl and $C(R)_3$ is CH_3.

Claim 33(Original): The method according to claim 27 wherein:

R^{30} is hydrogen;

each R^3 is an endosome membrane disruption promoting component of the formula -B-$(CR^1R^2)_j$-$C(R)_3$;

wherein B is a bridging group of the formula: -$(CR^1R^2)_k$-C(=O)-Z-; R^1 and R^2 are each hydrogen; j is 1, k is 11; Z is O and $C(R)_3$ is C_6H_5 aromatic.

Claim 34(Original): The method according to claim 27 wherein:

R^{30} is hydrogen;

each R^3 is an endosome membrane disruption promoting component of the formula -B-$(CR^1R^2)_j$-$C(R)_3$;

wherein B is a bridging group of the formula: -$(CR^1R^2)_k$-C(=O)-Z-; R^1 and R^2 are each hydrogen; j is 0, k is 11; Z is OH and $C(R)_3$ is absent.

Claim 35(Original): The method according to claim 27 wherein:

R^{30} is hydrogen;

one R^3 is hydrogen; and

one R^3 is an endosome membrane disruption promoting component of the formula -B-$(CR^1R^2)_j$-$C(R)_3$;

wherein B is a bridging group of the formula: $-(CR^1R^2)_k-C(=O)-Z-$; R^1 and R^2 are each hydrogen; j is 1, k is 11; Z is O and $C(R)_3$ is C_6H_5 aromatic.

Claim 36(Original): The method according to claim 27 wherein:

R^{30} is hydrogen;

one R^3 is hydrogen; and

one R^3 is an endosome membrane disruption promoting component of the formula $-B-(CR^1R^2)_j-C(R)_3$;

wherein B is a bridging group of the formula: $-(CR^1R^2)_k-C(=O)-Z-$; R^1 and R^2 are each hydrogen; j is 0, k is 11; Z is OH and $C(R)_3$ is absent.

Claim 37(Original): The method according to claim 27 wherein:

R^{30} is hydrogen;

each R^3 is an endosome membrane disruption promoting component of the formula $-B-(R^5)R$;

wherein R is absent and B is a bridging group of the formula: $-(CR^1R^2)_k-N(R)-C(=O)-Z-$, in which R, R^1 and R^2 are each hydrogen; k is 5; Z is absent and

R^5 is α-3'-propionyl thiomannoside.

Claim 38(Original): The method according to claim 27 wherein:

R^{30} is hydrogen;

one R^3 is hydrogen; and

one R^3 is an endosome membrane disruption promoting component of the formula $-B-(R^5)R$;

wherein R is absent and B is a bridging group of the formula: $-(CR^1R^2)_k-N(R)-\{-(C=O)-CH_2-O-[-(CH_2)_2-O-]_l-(CH_2)_k-N(R)\}_p-C(=O)-Z-$ in which R, R^1 and R^2 are each hydrogen; k is 5; l is 5; p is 1; Z is absent; and

R^5 is α-3'-propionyl thiomannoside.

Claim 39(Original): The method according to claim 27 wherein:

R^{30} is hydrogen;

one R^3 is hydrogen; and

one R^3 is an endosome membrane disruption promoting component of the formula $-B-(R^5)R$;

wherein R is absent and B is a bridging group of the formula: $-(CR^1R^2)_k-N(R)-\{-(C=O)-CH_2-O-[-(CH_2)_2-O-]_l-(CH_2)_k-N(R)\}_p-C(=O)-Z-$ in which R, R^1 and R^2 are each hydrogen; k is 5; l is 20; p is 1; Z is absent; and

R^5 is α-3'-propionyl thiomannoside.

Claim 40(Original): The method according to claim 27 wherein:

R^{30} is hydrogen;

one R^3 is hydrogen; and

one R^3 is an endosome membrane disruption promoting component of the formula $-B-(R^5)R$;

wherein R is absent and B is a bridging group of the formula: $-(CR^1R^2)_k-N(R)-\{-(C=O)-CH_2-O-[-(CH_2)_2-O-]_l-(CH_2)_k-N(R)\}_p-C(=O)-Z-$ in which R, R^1 and R^2 are each hydrogen; k is 5; l is 5; p is 1; Z is absent; and

R^5 is N^2, N^6-bis(β-3'-propionyl galactosyl-β1-4-thioglucoside)lysyl-N^6-(β-3'-propionyl galactosyl-β1-4-thioglucoside)lysine.

Claim 41(Original): The method according to claim 8, wherein said transfer moiety comprises more than one cationic polyamine component.

Claim 42(Original): The method according to claim 8, wherein a first cationic polyamine component comprises an endosome membrane disruption promoting component and a second cationic polyamine component comprises a receptor specific binding component.

Claim 43(Original): The method according to claim 42, wherein the first cationic polyamine component has an endosome membrane disruption promoting component of the formula -B-$(CR^1R^2)_j$-$C(R)_3$, wherein $C(R)_3$ is absent, R^1 and R^2 are each hydrogen; j is 0 and B is a bridging group selected from the group consisting of (i), (ii), (iii) and (iv).

Claim 44(Original): The method according to claim 42, wherein the first cationic polyamine component has an endosome membrane disruption promoting component of the formula -B-$(CR^1R^2)_j$-$C(R)_3$, wherein $C(R)_3$ is absent, R^1 and R^2 are each hydrogen; j is 0 and B is a bridging group of the formula: -$(CR^1R^2)_k$-C(=O)-Z-; k is 11 and Z is OH.

Claim 45(Original): The method according to claim 42, wherein the first cationic polyamine component has an endosome membrane disruption promoting component of the formula -B-(R^4)R, wherein R^4 is a cholesteryl derivative.

Claim 46(Original): The method according to claim 42, wherein the first cationic polyamine component has an endosome membrane disruption promoting component of the formula -B-(R^4)R, wherein R is a absent and B is a bridging group of the formula: -$(CR^1R^2)_{j=}$-X-, in which R, R^1 and R^2 are each hydrogen; j= is 5; and X is N(R) and where R^4 is a type (iii) cholesteryl derivative of formula (3): R^{6a} is O-C(=O)- and a point of attachment of cholesteryl derivative; R^{7a} is C_5 alkyl; and R^{8a} is C_1 alkyl.

Claim 47(Original): The method according to claim 42, wherein the receptor specific binding component of said second cationic polyamine component is selected from the group consisting of:

β-3= propionyl galactosyl-β1-4-thioglucoside;

N^2, N^6-bis(β-3'-propionyl galactosyl-β1-4-thioglucoside)lysine;

N^2, N^6-bis(β-3'-propionyl galactosyl-β1-4-thioglucoside)lysyl-N^6-(β-3'-propionyl galactosyl-β1-4-thioglucoside)lysine;

α-3'-propionyl thiomannoside; and

α-3'-propionyl thiomannoside-6-phosphate.

Claim 48(Original): A method for delivering a nucleic acid molecule to a targeted population of cells of an individual, said method comprising the step of delivering to the individual a multifunctional molecular complex comprising:

A) a nucleic acid molecule; and

B) a transfer moiety comprising one or more cationic polyamine components, wherein each cationic polyamine is non-covalently bound to said nucleic acid molecule and each independently comprises a cationic polyamine of the formula (1):

$$NR(R^3)\text{-}[\text{-}(CR^1R^2)_m\text{-}N(R^3)\text{-}]_n\text{-}(CR^1R^2)_m\text{-}NR(R^3)$$

(1)

wherein:

R, R^1 and R^2 are each independently selected from the group consisting of hydrogen and $C_{1\text{-}6}$ alkyl;

m in each occurrence is independently selected from the integers 2 through 5 inclusive;

n is selected from the integers 1 through 10 inclusive;

R^3 is independently selected from the group consisting of hydrogen; C_{1-6} alkyl, and an endosome membrane disruption promoting component, or $NR(R^3)$ is guanidino;

wherein said transfer moiety comprises at least one endosome membrane disruption promoting component attached to at least one nitrogen atom of at least one of said cationic polyamine components;

wherein said transfer moiety comprises at least one receptor specific binding component attached either (i) to a further nitrogen atom of at least one of said cationic polyamine components to which said one or more endosome membrane disruption promoting components is attached, or (ii) to a nitrogen atom of at least one further polyamine component which does not have attached thereto any endosome membrane disruption promoting component,

wherein said receptor specific binding component which is a ligand for natural receptors of said target cells.

Claim 49 (New): A method according to Claim 2 wherein the peptide, protein or nucleic acid molecule is a therapeutic agent.

Claim 50 (New): A method for the transfer of a nucleic acid composition to cells, comprising the step of introducing a multifunctional molecular complex into cells, wherein said multifunctional molecular complex comprises:

(a) a nucleic acid molecule; and

(b) a transfer moiety comprising:

(i) one or more cationic polyamine components, wherein each cationic polyamine is non-covalently bound to a nucleic acid composition and comprises from three to twelve nitrogen atoms; and

(ii) one or more endosome membrane disruption promoting components independently selected from the group consisting of:

(a) at least one lipophilic long chain alkyl group attached to a nitrogen atom of said polyamine,

(b) a fusogenic peptide attached to a nitrogen atom of said polyamine through a short alkyl bridging group having a terminal carboxyl, amino, hydroxyl or sulfhydryl group, and

(c) a cholic acid or cholesteryl or a derivative thereof attached to a nitrogen atom of said polyamine through a short alkyl bridging group having a terminal carboxyl, amino, hydroxyl or sulfhydryl group,

wherein said multifunctional molecular complex transfers said nucleic acid composition to said cells.

Claim 51 (New): The method according to claim 50, wherein said transfer moiety further comprises at least one receptor specific binding component which is a ligand for a receptor on a target cell.

Claim 52 (New): The method according to claim 50, wherein the receptor specific binding component is attached through a bridging group to either (i) to a further nitrogen atom of at least one of said cationic polyamine components to which said one or more endosome membrane disruption promoting components is attached, or (ii) to a nitrogen atom of at least one further polyamine component which does not have attached thereto any endosome membrane disruption promoting component.